

The effects of e-cigarette on periodontium: A narrative review

Effects of e-cigarette on periodontium

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Abstract

Recently, the popularity of alternative cigarette types, namely electronic nicotine delivery system (ENDS) or electronic cigarettes (e-cigarettes) has increased. E-Cigarettes are electrical devices that vaporize liquid solution based on propylene or polyethylene glycol to form an aerosol mist containing varying levels of nicotine. The effects of smoking on both general and oral health are well-known globally, but the effects of e-cigarettes on periodontium are still uncertain. The aim of the present narrative review is to discuss the effects of e-cigarettes on the periodontium by using different published research papers about e-cigarette, vaping, smoking, oral health, and periodontium. Based on the evidence provided in the present narrative review, it can be concluded that the use of e-cigarettes has a significant impact on oral health. It is also used as a tool for smoking cessation, but there is a lack of evidence on its efficacy.

Keywords

Smoking; E-cigarette; Nicotine; Periodontium

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Introduction

Smoking has a negative effect on oral health, including periodontal diseases. Periodontal disease is an inflammation of the supporting tissues of the teeth; it also impaired wound healing and increases the risk of oral and lung cancer [1].

One of the problems of smoking is the addiction to nicotine, which makes it difficult for smokers to quit smoking. However, there is a substitute for nicotine, such as transdermal patches, which may help smokers to quit smoking [2].

Recently, there has been a new popular alternative of cigarettes that simulates conventional smoking, called the E-nicotine delivery system. It is an electrical device, which consists of a metal heating element, solution container and battery. This device vaporizes solutions by heating the metal to give an aerosol, the solution contains diluents like propylene glycol and vegetable or aqueous glycerin, nicotine and flavors to get a better taste [1,3,4].

Smoking is one of the major public health issues and its effects on the periodontium are significant. E-cigarettes are used as a tool for smoking cessation, even though it contains more amount of nicotine. The present review aims to list out the effects of E-cigarette on the periodontium.

Material and Methods

By utilizing the terms electronic cigarettes, vaping, smoking, oral health and periodontium, the data in English-language was extracted from Medline, ScienceDirect and Scopus published from 2014 to 2020. An original research paper with human studies, case reports and the effect of electronic cigarettes on oral health was included; review articles and editorials were excluded for this review. Through the selection procedure, 8 articles were selected and grouped as e-cigarettes and conventional smoking, and e-cigarette and periodontium.

Discussion

E-cigarette and conventional smoking

The differences between E-cigarettes and conventional smoking is that E-cigarette may contain a high amount of nicotine, it does not contain tobacco, and the simplicity of using E-cigarettes make the users vaping more [5].

Worldwide governments are making policies for nicotine control. Regarding the e-cigarette, there still is no regulation of the level of nicotine dose [1,5]. Apart from nicotine, other contaminants and carcinogens are also found in e-cigarettes aerosol.1,5 This raises a question about the safety and purity of ingredients used for the e-cigarette.

E-cigarettes are rapidly spreading among teenagers due to flavoring agents and as a status symbol, which may make them more acceptable to use than conventional smoking. Recent studies (Lauren et al., 2014) [6] have not shown any effect of flavoring agents on the oral cavity, but there is a risk for pulmonary effect.

E-cigarette and periodontium

Studies have scientifically proven that traditional cigarettes affect the health of the surrounding tissue of teeth in terms of disease progression and periodontal healing. However, the data on the effect of E-cigarette are still widely controversial and further research needs to be installed.

One study reported that the bleeding index significantly differed for E-cigarette users, and it gives a wonder because the E-cigarette was thought to be less harmful to the body and an alternative way for smoking quit [1]. Also, Behavioral Risk Factor Surveillance System survey data (2016) suggested that there will be more teeth exfoliation due to dental caries and periodontal disease with the use of E-cigarette.

Moreover, Willershausen et al., (2014) reported that direct exposure to the ingredient of E-cigarette such as the E-liquid will cause a harmful effect on gingival fibroblasts and periodontal ligament. Regarding wound healing, Lei et al., (2017) mentioned that the E-cigarette products affect oral myofibroblast differentiation, which will affect wound healing by reducing wound contraction by these cells.

Cellular apoptosis and permanent DNA damage were found to be associated with the use of E-cigarette [7]. Also, they found a strong relationship between the use of nicotine and healing by reducing the angiogenesis and differentiation of osteoblast. Besides, the use of E-cigarette may affect implant success because the nicotine in E-cigarette may impair the bone formation and healing potential at the implant and bone interface [5].

Regarding microbiology, they found that the use of E-cigarettes will enhance the *Candida albicans* to evade soft tissue defenses by overgrowth and transition. Also, they revealed an increase in terms of pathogenesis, transition, and virulent genes, such as SAPs of oral microbes due to E-cigarettes [8].

Recently, Javed et al., (2017) revealed that the E-cigarette use not detrimental as a conventional cigarette, in addition, there is no difference between the periodontal status of E-cigarette users and nonsmokers. It also revealed that the E-cigarette induces gingival inflammation similar to the conventional cigarette.7 However, plenty of respectable studies report that the E-cigarette liquid may have a potentially harmful result due to unknown effects of the ingredient [2].

Conclusion

To date, the true effect of E-cigarettes is not completely known, but it has been confirmed that the effect of nicotine, which is involved in E-cigarettes ingredients, deteriorates healing, bone formation and bacterial violence.

In epidemiological studies, the relationship between smoking and the loss of attachment of periodontal tissues has been adduced; these findings revealed that regardless of the type of tobacco used, there is a huge risk for developing periodontitis. The bleeding index was significant for those using E-cigarettes, which gives an idea for unknown risk of this type, nowadays, it is becoming more popular and further studies should be established to detect the true risk, which might be extremely harmful to the general health and the oral cavity.

Programs and further policies are highly recommended to educate the users about the effect of nicotine, which is present in conventional types and E-cigarettes.

Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and human rights statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

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Conflict of interest

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